

WHAT IS CLAIMED IS:

1. A composite laminate structure having improved damping characteristics, comprising
 - a damping lamina having from 40 to 70 wt% fibers impregnated within a first thermosetting resin matrix;
 - 5 a structural lamina having from 40 to 70 wt% fibers impregnated within a second thermosetting resin matrix; and,
 - wherein the first resin is present in the viscoelastic state and the second resin is present in the glassy state.
- 10 2. The structure of Claim 1, wherein each of the damping and structural lamina comprise from 2 to 20 plies.
3. The structure of Claim 1, wherein the fibers of the laminae are selected from the group consisting of carbon fiber, aramid fiber, glass fiber, and combinations
15 thereof.
4. The structure of Claim 3, wherein the fibers of the structural lamina are continuous carbon fibers.
- 20 5. The structure of Claim 1, wherein the thermosetting resins of the damping and the structural laminae are epoxy resins with thermal stability of at least 200°F.
6. The structure of Claim 5, wherein the epoxy resin of the damping
25 lamina has a plasticizer content of between 12wt% and 35wt% by total weight of the first resin and wherein the epoxy resin of the structural lamina has a plasticizer content of less than 10wt% by total weight of second resin.
7. The structure of Claim 6, wherein the plasticizer content of the second
30 resin is less than 5wt% by total weight of the second resin.

8. The structure of Claim 6, wherein the plastisizer content of the first resin is between 12.5wt% and 17wt% by total weight at the first resin.

9. The structure of Claim 1, further comprising a plurality of damping
5 laminae and a plurality of structural laminae, wherein the structural laminae comprise the outer laminae of the laminate.

10. A composite laminate structure comprising
a damping lamina having from 40 to 70 wt% fibers impregnated within a first
10 thermosetting resin matrix;
a structural lamina having from 40 to 70 wt% fibers impregnated with a
second thermosetting resin matrix; and,
wherein the first resin resides above its glassification temperature and wherein
the second resin resides below its glassification temperature.

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11. The structure of Claim 10, wherein each of the damping and structural
second lamina comprise from 2 to 20 plies.

12. The structure of Claim 11, wherein the fibers of the laminates are
20 selected from the group consisting of carbon fiber, aramid fiber, glass fiber, and
combinations thereof.

13. The structure of Claim 12, wherein the fibers of the structural lamina
are continuous carbon fibers.

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14. The structure of Claim 10, wherein the thermosetting resin of the
damping and the structural lamina is an epoxy resin with thermal stability of at least
200°F.

15. The structure of Claim 10, wherein the second resin has a plastisizer of
30 less than 10wt% by total weight of the second resin.

16. The structure of Claim 10, wherein the first resin has a plastisizer content of between 12wt% and 35wt% by total weight of the first resin.

17. The structure of Claim 10, further comprising a plurality of damping
5 laminae and a plurality of structural laminae, wherein the structural laminae comprise the outer laminae of the laminate.

18. A method of fabricating a laminate structure having improved damping characteristics, comprising the steps of
10 forming a damping lamina by impregnating a fiber layer with a first thermosetting resin matrix having a plastisizer content of between 12wt% and 35wt% by total weight of the first resin;
forming a structural lamina by impregnating a fiber layer with a second thermosetting resin matrix having a plastisizer content of less than 10wt% by total
15 weight of second resin;
layering the damping and structural lamina; and
curing the resins.

19. The method of Claim 18, wherein the damping lamina has a fiber
20 content of about 40wt% to about 70wt% fiber per total weight of the lamina.

20. The method of Claim 18, wherein the structural lamina has a fiber content of about 40wt% to about 70wt% fiber per total weight of the lamina.

21. The method of Claim 18, wherein the step of forming the damping
25 lamina comprises the steps of
forming from 2 to 20 plies of fiber impregnated with the first thermosetting resin and layering the plies to form the damping lamina.

22. The method of Claim 18, wherein the step of forming the structural
30 lamina comprises the steps of
forming from 2 to 20 plies of fiber impregnated with the second thermosetting resin and layering the plies to form the structural lamina.

23. The method of Claim 18, wherein the plastisizer content of the second resin is less than 5wt% by total weight of the second resin.

24. The method of Claim 18, wherein the plastisizer content of the first
5 resin is between 12.5wt% and 17wt%.

25. The method of Claim 18, further comprising the steps of
forming a plurality of damping laminae and a plurality of structural laminae;
and,
10 layering the laminae such that the structural laminae comprise the outer
laminae of the laminate.

26. The method of Claim 25, further comprising the step of laminating the
plurality of damping laminae and structural laminae to an additional dissimilar
15 laminate, thereby forming a hybrid laminate.

27. The method of Claim 26, wherein the fibers of the dissimilar laminate
are of dissimilar composition as those fibers of the damping and structural laminae.

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